

Petrunyk, Inna; Pfeifer, Christian

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## RESEARCH ARTICLE

# Potential duration of unemployment benefits and labor market outcomes for older workers with health impairments in Germany

Inna Petrunyk<sup>1</sup> | Christian Pfeifer<sup>1,2</sup> 

<sup>1</sup>Institute of Economics, Leuphana University Lueneburg, Lueneburg, Germany

<sup>2</sup>Forschungsinstitut zur Zukunft der Arbeit (IZA), Germany

## Correspondence

Institute of Economics, Leuphana University Lueneburg, Universitätsallee 1, 21335 Lueneburg, Germany.

Email: [pfeifer@leuphana.de](mailto:pfeifer@leuphana.de)

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## Abstract

This research note estimates the causal effects of a cut in the potential duration of regular unemployment benefits for older workers in Germany on the labor market outcomes of individuals with health impairments. The analyzed reform is a natural experiment that allows a difference-in-differences strategy with treatment intensity. The results provide evidence for a significant decrease in the number of days in regular unemployment benefits and an increase in the number of days in employment. However, the results also suggest a significant increase in the number of days in unemployment (social) assistance, which are granted upon exhaustion of regular unemployment benefits.

## KEYWORDS

difference-in-differences, labor market reform, policy evaluation, unemployment insurance

## JEL CLASSIFICATION

I1, J2, J65

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## 1 | INTRODUCTION

Long unemployment durations among older workers, who are eligible for extended unemployment benefits, have been a problem for European labor markets in the past decades. In Germany, this problem has been tackled by a reform of the unemployment insurance system that was announced in 2003 and implemented in 2006. It involved a substantial reduction in the potential duration of regular unemployment benefits to stimulate employment among older workers by alleviating the disincentive effect of long benefits. The reform affected age groups 45 years and older, while younger workers were not subject to the policy change, and the reductions differed between age groups. The design of the reform provides a natural experimental setting on which our difference-in-differences identification strategy relies to evaluate the causal relationship between the potential benefit duration and labor market outcomes of affected individuals. Our research note is most closely related to evaluation papers of the same reform in Germany. For example, Dlugosz et al. (2014) apply a difference-in-differences approach and find decreased unemployment inflows for individuals aged 52 and older. Their results further indicate large anticipation effects of the reform in the three months before the policy change came into force. Riphahn and Schrader (2020) also use a difference-in-differences approach and find that affected older age groups have lower job exit rates, higher job finding rates, a higher probability of remaining employed, and a lower probability of remaining unemployed.<sup>1</sup>

We analyze the treatment intensity effect of the reduction in the potential duration of unemployment benefits in months—instead of binary group assignments—on the number of days in regular unemployment benefits, days in unemployment (social) assistance, and days in employment subject to social insurance contributions per calendar year. Although the reform aims at increasing employment and reducing unemployment, an adverse effect might be that more individuals slip down in unemployment (social) assistance if they do not find employment and regular unemployment benefits are exhausted earlier. Instead of being interested in the total population as in most other evaluation studies, we focus on a group of workers with health impairments, who might be more vulnerable due to employment problems and a risk of slipping down in unemployment (social) assistance. For this purpose, we use a large sample of individuals who have undergone medical rehabilitation and re-enter the labor market afterward. Note that this is not a small group, as the German Statutory Pension Insurance (2014) approves more than one million applications for medical rehabilitation per year, and the numbers continue to increase in an aging society.

## 2 | UNEMPLOYMENT BENEFITS AND POLICY CHANGES

Similar to other European countries, the unemployment compensation system in Germany relies on two main pillars, regular unemployment benefits (“Arbeitslosengeld 1,” henceforth UB-1) and unemployment (social) assistance (“Arbeitslosengeld 2,” henceforth UB-2). UB-1 is funded by employee and employer contributions and is administered by the Federal Employment Agency. Entitlement to receive UB-1 is conditioned on contributions to the insurance scheme for at least

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<sup>1</sup> Please see Petrunyk and Pfeifer (2018) for a detailed literature review, discussion of the institutional framework and reforms, description of the data and variables, presentation of results with binary treatment group assignment, and test of identification assumptions such as parallel trends for treatment and control group before the implementation of the reform.

**TABLE 1** Maximum duration (in months) of unemployment benefits (UB-1)

Age category	Before February 2006	Reduction	February 2006 to December 2007	Extension	Since January 2008
<45	12	0	12	0	12
45–46	18	–6	12	0	12
47–49	22	–10	12	0	12
50–51	22	–10	12	+3	15
52–54	26	–14	12	+3	15
55–56	26	–8	18	0	18
57	32	–14	18	0	18
>57	32	–14	18	+6	24

12 months within the last 24 months before a job loss. Potential benefit duration depends on the employment history of unemployed workers and discontinuously increases with age to account for difficulties that older unemployed individuals might have in re-entering the job market. Workers who reached the statutory retirement age are excluded from the coverage. UB-1 replaces 60% (67% for claimants with children) of the last net salary (capped at the social security ceiling). If employees themselves take the initiative to terminate the employment relationship, benefits can be suspended for up to 12 weeks. Furthermore, recipients of UB-1 are required to actively search for a job and to prove their job search activities upon request from the local employment office. Lack of compliance with these requirements may lead to benefit cuts. Upon exhaustion of UB-1 or in case of no entitlement to them, needy unemployed jobseekers receive tax-financed UB-2, which is unconstrained by previous earnings and is granted without temporal restrictions. UB-2 is means-tested against household income and aims at providing a living at the subsistence level.

We evaluate a reform that was agreed on in December 2003 (Hartz IV law) and affected workers who lost their jobs after January 31, 2006. This major policy change implied a substantial reduction in the potential duration of UB-1 for workers aged 45 years or older and largely repeals the extensions during the 1980s that were motivated by an increasing unemployment rate and long average spell duration among older workers in West Germany (Hunt, 1995). The largest reduction in the potential benefit duration is 14 months. This major change lasted only until December 2007, when the German government partly re-extended the potential benefit duration again. Table 1 illustrates the changes in the potential duration of UB-1 for each affected age category.

UB-2 was introduced in January 2005 as part of the Hartz IV law. It largely replaced the two previous components of the German unemployment compensation system, unemployment assistance (“Arbeitslosenhilfe”), granted to unemployed jobseekers upon exhaustion of unemployment benefits, and social assistance (“Sozialhilfe”), granted to all other needy individuals. The reform enhanced support to increase employability by promoting education programs, and so on, and introduced strict rules aiming to motivate recipients to actively search for a job and to cooperate with job centers. Practical enforcement of new rules is achieved through benefits sanctions.

### 3 | DATA AND SAMPLE RESTRICTIONS

The longitudinal routine data collected by the German Statutory Pension Insurance include a random sample of 20% of all individuals who completed medical rehabilitation treatments granted by

this insurer. A characterizing feature of medical rehabilitation consists of treating severe health deficiencies such as renal failure, disorders involving the metabolic and endocrine systems (e.g., diabetes mellitus), nervous system (e.g., migraine and sleep disorder), circulatory system (e.g., heart failure), respiratory system (e.g., asthma), digestive system (e.g., liver disorder), musculoskeletal system (e.g., back pain), mental and behavioral disorders (e.g., depression and alcohol abuse), and skin diseases (e.g., dermatitis). A scientific use file of the data on completed rehabilitation between 2002 and 2009 was made available by the Research Data Centre of the German Pension Insurance (FDZ-RV-SUF, 2012). The data consist of three original databases (SUFERSDV09BYB, SUFERSDV09MCB, SUFERSDV09KOB), which each contain different variables.

We restrict our sample to individuals aged between 38 and 62 in the outcome year who participated in only one medical rehabilitation in the observation period (approximately 75% of the whole sample), either before the UB-1 reform or thereafter. Thus, the data set takes the form of pooled cross-sections with information before and after rehabilitation. We keep only the years 2005 (pre-reform) and 2007 (post-reform) and focus on individuals employed before their rehabilitation. This temporal restriction relies on the following considerations. First, UB-2 was introduced in January 2005, and the potential duration of UB-1 was partially re-extended in January 2008 so that we exclude the years prior to 2005 and after 2007. Even if UB-2 was introduced in January 2005, we cannot rule out that some implementations of the reform came in effect over the course of the year 2005. However, due to our data restriction on individuals who have been employed and participated in medical rehabilitation in the year before, this problem should be less severe than for individuals who had been, for example, in the “old” social and unemployment assistance schemes already in the year 2004. Moreover, this potential measurement error in UB-2 should occur independently of age, that is, of our treatment assignment variable.

Second, the exclusion of the year 2006 is motivated by a potential transition period and anticipation effect of the reform. Because we include in the post-reform outcome year 2007 only workers participating in medical rehabilitation in 2006, that is, already after the reform began in January 2006, we no longer expect an anticipation effect. However, there might be a small anticipation effect of the reform in our control group in the outcome year 2005 if workers in 2005 would have already chosen unemployment instead of employment due to the expected reform. This anticipation effect in the control group would lead to a smaller estimated treatment effect, that is, we would present lower bounds. We further restrict our sample to those employed at least 12 months in the two calendar years before rehabilitation and the rehabilitation year, that is, during three calendar years before the outcome year. This restriction is supposed to broadly approximate fulfillment of eligibility criteria both under the old and the new regime. The total number of observations in our sample adds up to 94,990 individuals. Table A1 in the Appendix in the Supporting Information illustrates the data structure for this estimation sample, and Table A2 in the Appendix in the Supporting Information illustrates the data structure for a placebo test applied for the pre-reform years 2004 and 2005. Descriptive statistics for all variables are displayed in Table A3 in the Appendix in the Supporting Information.

#### 4 | DIFFERENCE-IN-DIFFERENCES DESIGN

The reform of UB-1 affected only individuals aged 45 years or older. The natural experimental setting would allow us to apply a standard difference-in-differences design with binary assignment to treatment and control groups according to age. The general estimation framework can be described as in Equation (1) and estimated with OLS.  $Y$  denotes the outcomes of interest, which are

**TABLE 2** Number of observations in the treatment intensity variable (REDUCTION2007)

UB-1 reduction in months	2005 (Pre-reform)	2007 (Post-reform)	Total
0	45,703	11,128	56,831
6	0	4238	4238
8	0	4972	4972
10	0	11,174	11,174
14	0	17,775	17,775
Total	45,703	49,287	94,990

Note: Sample for years 2005/2007 (employed before rehabilitation).

Source: SUFRSDV09BYB, SUFRSDV09MCB, SUFRSDV09KOB (FDZ-RV-SUF, 2012).

total days in UB-1, in UB-2, and in employment subject to social insurance contributions (WORK) in the complete calendar year after medical rehabilitation. The total days per calendar year also capture recurring spells and not only entry or exit in the initial spell (Schmieder et al., 2012). Self-employment, minor employment, civil service, and nonemployment, such as retirement due to health reasons or other labor market exits, are not considered so that the numbers for our three outcomes do not sum up to 365 days per year. Unfortunately, the data do not include information about having different outcome statuses on the same day. For example, a person who is coded as being in UB-1 on a given day in our data can also receive specific benefits from the UB-2 system, but this person would still be subject to UB-1 benefits and affected by the reform. Moreover, unemployed persons can, for example, additionally take up minor employment, which is, however, not part of our outcome variable WORK, as it is not a regular employment subject to social insurance contributions.

$\beta_1$  is the parameter for the treatment group-specific effect (age trend),  $\beta_2$  is the parameter for the time trend common to the control and the treatment groups in the year 2007,  $\beta_3$  is the parameter of interest that provides the difference-in-differences estimate of the average treatment effect on the treated,  $X$  is a vector of control variables (sex, marital status, nationality, education, job position, occupation, federal state, and rehabilitation diagnosis),  $\alpha$  is a constant, and  $\varepsilon$  is the error term.

$$Y = \alpha + \beta_1 AGEGROUP + \beta_2 YEAR2007 + \beta_3 AGEGROUP \times YEAR2007 + \delta X + \varepsilon. \quad (1)$$

In Petrunyk and Pfeifer (2018), we estimated this standard difference-in-differences design with binary treatment assignment and carefully checked the identifying assumption of parallel trends for the treatment and control groups before the implementation of the reform. In this research note, we extend this standard approach by replacing the interaction term between the binary age (treatment) group indicator and the post-reform year 2007 with a treatment intensity variable that measures the UB-1 reduction in months for the different age groups in Equation (2). The treatment intensity variable follows the difference-in-differences strategy because it is in principle an interaction between treatment intensity, which varies by age (see Table 1), and the post-reform year 2007. Table 2 shows that treatment intensity is zero for all observations in 2005 and for all observations younger than 45 years in 2007, whereas treatment intensity is positive for all observations equal to or older than 45 years in 2007. In this framework,  $\beta_1$  still covers the age trend,  $\beta_2$  is the parameter for the time trend, and  $\beta_3$  is the parameter of interest, that is, the treatment intensity effect. Because treatment intensity is correlated with age (see Table 1), we use different specifications of age as controls (age, age<sup>2</sup>, age<sup>3</sup>, age dummies for each year) as sensitivity checks. We

further apply a placebo test for the years 2004 and 2005 and act as if the UB-1 reduction in months would have occurred in 2005, although 2004 and 2005 are both pre-reform years.

$$Y = \alpha + \beta_1 AGE + \beta_2 YEAR2007 + \beta_3 REDUCTION2007 + \delta X + \varepsilon. \quad (2)$$

## 5 | REGRESSION RESULTS

Our results for the treatment intensity (UB-1 reduction in months) allow an alternative quantitative interpretation than the results for a simple binary age treatment dummy ( $age \geq 45$ ), for which we have found that the treated group has on average approximately 10.5 fewer days in UB-1 per year, approximately 4.7 more days in UB-2, and approximately 13.6 more days in WORK (Petrunyk & Pfeifer, 2018). The results in Table 3 for Equation (2) indicate that the size of the treatment intensity effect is indeed smaller if nonlinearity of age is taken into account. Overall, the reduction in the potential duration of UB-1 by one month decreases UB-1 on average by more than 0.6 days per year, increases UB-2 on average by approximately 0.3 days per year, and increases WORK on average by more than 0.8 days per year. To rule out that our estimated treatment intensity effects are a statistical artifact, we perform a placebo test for the years 2004 and 2005 and act as if the UB-1 reduction in months would have occurred in 2005, although 2004 and 2005 are both pre-reform years. Because the estimated coefficients in the placebo tests are either not significantly different from zero or even have the opposite sign than the estimated treatment intensity effects for 2007, we are confident that the treatment intensity effects are not a statistical artifact.<sup>2</sup>

## 6 | DISCUSSION AND CONCLUDING REMARKS

Compared to Schmieder et al. (2012), who study the effects of an extension of unemployment benefits for older workers in Germany during the 1980s, our estimates are smaller. For example, Schmieder et al. (2012) report that an extension of unemployment benefits by six months increased registered unemployment by approximately 68 days within five years, which is on average equivalent to approximately 2.3 more days per year for a one-month extension, whereas our results indicate only 0.6 to 0.8 fewer days per year for a one-month reduction. A reason might be that individuals with health impairments in our sample are less responsive to incentives of the unemployment benefit system due to worse labor market prospects than healthy individuals.

Our results are in line with previous findings that the intended reform effects of reducing unemployment and increasing employment have been largely accomplished due to a reduction of the potential duration of regular unemployment benefits in Germany, even in our specific sample of individuals with health impairments. However, our results also suggest that these intended reform effects are accompanied by—at least from a social policy perspective—a rather unintended effect that part of the lower unemployment benefit claims after the reform is reasoned by higher unemployment (social) assistance claims. Such a slip down in unemployment (social)

<sup>2</sup> Note that the estimates for days of work are more sensitive to the specification of age, which is correlated with treatment intensity. It can be seen that the treatment effect in specification (1) with linear age ( $\beta = 1.74$ ) is significantly larger than for all nonlinear age specifications and that also the coefficient ( $\beta = 1.08$ ) in the placebo test is significantly positive. However, once we take nonlinearity of age into account, the coefficients in the placebo tests are not significant anymore.

TABLE 3 Results for treatment intensity (2005/2007) and placebo tests (2004/2005)

	Different specifications of age			
	(1) Age	(2) Age, age <sup>2</sup>	(3) Age, age <sup>2</sup> , age <sup>3</sup>	(4) Age dummies
Outcome: days UB-1				
UB-1 reduction in months	-0.96 <sup>***</sup> [0.09]	-0.65 <sup>***</sup> [0.09]	-0.60 <sup>***</sup> [0.09]	-0.81 <sup>***</sup> [0.10]
R <sup>2</sup>	0.12	0.12	0.12	0.12
Mean dep. variable (total sample 2005 + 2007)	39.58	39.58	39.58	39.58
Mean dep. var. (2005 vs. 2007)	48.03/31.74	48.03/31.74	48.03/31.74	48.03/31.74
Coefficient placebo 2004/2005	-0.03	0.22 <sup>*</sup>	0.23 <sup>*</sup>	0.12
Outcome: days UB-2				
UB-1 reduction in months	0.24 <sup>***</sup> [0.04]	0.27 <sup>***</sup> [0.05]	0.26 <sup>***</sup> [0.05]	0.36 <sup>***</sup> [0.05]
R <sup>2</sup>	0.07	0.07	0.07	0.07
Mean dep. variable (total sample 2005 + 2007)	6.15	6.15	6.15	6.15
Mean dep. var. (2005 vs. 2007)	7.07/5.30	7.07/5.30	7.07/5.30	7.07/5.30
Coefficient placebo 2004/2005	-0.18 <sup>***</sup>	-0.14 <sup>**</sup>	-0.14 <sup>**</sup>	-0.12 <sup>*</sup>
Outcome: days WORK				
UB-1 reduction in months	1.74 <sup>***</sup> [0.14]	0.86 <sup>***</sup> [0.15]	0.81 <sup>***</sup> [0.15]	0.95 <sup>***</sup> [0.16]
R <sup>2</sup>	0.20	0.20	0.20	0.20
Mean dep. variable (total sample 2005 + 2007)	261.68	261.68	261.68	261.68
Mean dep. var. (2005 vs. 2007)	249.46/273.00	249.46/273.00	249.46/273.00	249.46/273.00
Coefficient placebo 2004/2005	1.08 <sup>***</sup>	0.29	0.28	0.15

Note: The sample contains only individuals who were employed before the rehabilitation. Difference-in-differences results for years 2005/2007 (total  $N = 94,990$ , in 2005  $N = 45,703$ , in 2007  $N = 49,287$ ). Placebo tests for years 2004/2005 (total  $N = 97,513$ , in 2004  $N = 51,810$ , in 2005  $N = 45,703$ ) as if UB-1 reduction in months would have occurred in 2005. All control variables (see Table A3 in the Appendix in the Supporting Information) are included. Outcome variables are days per calendar year. OLS regressions. Robust standard errors in brackets.  $*p < 0.05$ ,  $**p < 0.01$ ,  $***p < 0.001$ .

Source: SUFRSDV09BYB, SUFRSDV09MCB, SUFRSDV09KOB (FDZ-RV-SUF, 2012).

assistance by some workers with health impairments who do not find a new job after medical rehabilitation that easily might be questionable from a social justice perspective, and for those individuals, extended unemployment benefit duration could be justified.

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## ORCID

Christian Pfeifer  <https://orcid.org/0000-0002-6066-1017>

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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